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Basic

Redstone RTPS Packet Payload ICD

Prepared By:

CLCS System Specification Team
CLCS Technical Integration
DE-CLC
Kennedy Space Center, FL 32899

Redstone
RTPS
Packet Payload ICD

Prepared By:

Thomas J. Jamieson, Systems Engineer

Richard M. Dawson, Systems Engineer

Approved By:

Kirk D. Lougheed, System Engineering and Technical Integration Lead

Ben Bryant, Application Software Lead

Larry Wilhelm, System Software Lead

Dennis Fougnie, Subsystem Engineering Lead

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1. INTRODUCTION

1.1 Scope

This Redstone RTPS Packet Payload Interface Control Document (ICD) defines the contents of packet payloads that are passed between processors of the Real-Time Processor Subsystem (RTPS) on the Real Time Critical Network (RTCN) and on the Display and Control Network (DCN) for the Redstone release. The RTPS is one of the systems that comprise the Checkout and Launch Control System (CLCS).

1.2 Purpose

This ICD is intended to serve as a reference document for systems programmers, as well as a baseline for software development. It will be used by RTPS (and CLCS simulation) programmers as a basis for the design, implementation, testing, and maintenance of the RTPS and any related systems that may evolve from this architecture.

1.3 Related Documents

84K00200	CLCS System Level Specification	April 15, 1997
84K00210	CLCS System Design Document	April 24, 1997
SS-P-0002-140T	Space Shuttle Computer Program Development Specifications (CPDS) SS Downlist/Uplink Software Requirements	October, 1995
SS-P-0002-150N	Space Shuttle Computer Program Development Specifications SS LDB Software Interface Requirements	March, 1996

1.4 Document Overview

This document is organized into 4 main sections. Section 1 contains the introduction to the document. Section 2, SYSTEM DATA PASSING PHILOSOPHY, introduces the packet payload (which carries the communication data between subsystems) and describes the format and content of the Packet Payload Headers and many of the Packet Payload Bodies. Section 3, C-C/RESPONSE PACKET PAYLOAD BODIES describes the contents of the bodies for each C-C and each Response. Section 4, LOG DATA PACKET PAYLOAD BODIES describes the contents of the bodies for each Log Data ID.

1.5 Document Conventions

Throughout this document, all references to bit position 0 refer to the least-significant, right-most bit of a byte, word, half word, or double word.

2. SYSTEM DATA PASSING PHILOSOPHY

2.1 Introduction

One goal of the RTPS is to provide a reliable, user-transparent means of passing data between processes and processors. The Reliable Messaging (RM) CSCI satisfies these goals. RM ensures reliability by providing fault tolerant data delivery with no undetected loss or corruption of data. RM ensures user transparency by converting user application requests to transmit data between processors into the appropriate packet payloads and passing these payloads to the RTCN or DCN.

Each packet payload consists of a header and a body. The header contains such data as packet payload type, logging flags, source processor, payload length, source location, and time. The body contains the actual data that it is desired to pass between 2 or more processors or processes.

2.2 Description of ACKs and NACKs

RM generates either an ACK (acknowledgment) or NACK (negative acknowledgment) for every packet type except the System Event Notification Packet type. While it is not the intent of this document to specify the contents of the ACKs or NACKs, much of this document will drive the SDC retrieval requirements because this document defines the contents of the Packet Payload data that is recorded. ACKs for C-Cs and Responses will be recorded in CLCS. Therefore, the following data is provided as the current understanding of what the recorded ACKs and NACKs should provide:

ACK

1. Ability to derive the sending CPU
2. Ability to derive the receiving CPU
3. Ability to associate the ACK to a specific C-C or Response

NACK

1. Ability to derive the sending CPU
2. Ability to derive the receiving CPU
3. Ability to associate the NACK to a specific C-C or Response
4. NACK failure reason code

2.3 Packet Payload Types

The data that are passed between processors can be categorized into several types of packet payloads. The following table lists the packet payload names and the Type Codes (Pld Type), as contained in the first byte of each header.

Table 1. Packet Payload Type Codes (In Hex)

PACKET PAYLOAD NAME	SOURCE CPU ON RTCN			SOURCE CPU ON DCN		
	GW	DDP	CCP	DDP	CCP	HCI
Change Data	02	22	42*	82		
Health and Status	03	23	43	83		C3
Log Data	04	24	44	84	A4	C4
System Event Code	05	25	45	85	A5	C5
Computer-to-Computer Messages	01	21	41	81	A1	C1
Computer-to-Computer Responses	00	20	40	80	A0	C0

* = Derived measurements/pseudos to DDP.

The above packet payload type codes are based on the full hardware configuration of one or more HCI computers, one or more CCP computers, one or more DDP computers, one or more Gateways, a RTCN and a DCN. In a reduced system configuration one or more systems could be hosted on one computer. The packet payload type codes will be set as they would have been on a full hardware configuration. The assignment of a packet payload type codes will be based on the assumption that the target system is a full hardware configuration and the application software does not need to know the configuration. For example: a logical DDP and logical CCP could be located in one computer. The packet payload type values for data that is passed between the two computers would be the same as if they were located on different computers. DDP to CCP change data would be 82 no matter what the actual hardware configuration is.

The above packet payloads can further be divided into 2 types; Non C-C (Computer-to-Computer [i.e. IPC])/Response Packet Payloads and C-C/Response Packet Payloads. Following are descriptions of each type.

2.4 Non C-C/Response Packet Payloads

The Non-C-C/Response Packet Payloads consist of the first 4 packet payloads listed in the above table. That is, all packet payloads that are not C-Cs or Responses.

2.4.1 Non C-C/Response Packet Payload Headers

The Non C-C/Response Packet Payload headers are 16 bytes in length and contain the following data:

Table 2. Non C-C/Response Packet Payload Header

1 byte	1 byte	2 bytes	2 bytes	1 byte	3 bytes	6 bytes
Pld. Type	Flags (Log)	Logical Source ID	Payload Length In Bytes	Place	Spare	Time

1. Pld Type = 1 byte = 2 = Change Data Packet Payload
2. Flags = 1 byte = flags for logging = B6 = 1 = Log This Transaction Locally
   = B5 = 1 = Log This Transaction Temporarily
   = B4 = 1 = Log This Transaction to Archive Storage
   = B3 = 1 = One or more logging bits have been modified by a command

   Logical Source = 2 bytes = The logical source CPU ID of the source of this transmission (See Table 21. Sample Firing Room Logical RSYS IDs And Logical CPU IDs For C-C Headers)
4. Payload Length in bytes = 2 bytes = length of Packet Payload body
5. Place = 1 byte = An identifier of the Test Set that is the source of this transmission
6. Spare = 3 bytes = reserved for future use
7. Time = 6 bytes = Time in MS (See Paragraphs 2.6 and 2.7). The contents of the header time entry are defined as follows:

Table 3. Packet Payload Header Time Entry

<table>
<tr><th>B15</th><th>B14</th><th>B13</th><th>B12</th><th>B11</th><th>B10</th><th>B9</th><th>B8</th><th>B7</th><th>B6</th><th>B5</th><th>B4</th><th>B3</th><th>B2</th><th>B1</th><th>B0</th></tr>
<tr><td>E1</td><td colspan="6">Reserved</td><td colspan="9">Julian Day</td></tr>
<tr><td colspan="5">Spare</td><td colspan="11">11 MSB of MSTOD</td></tr>
<tr><td colspan="16">16 LSB of MSTOD</td></tr>
</table>

E1 = 0 = External Time, = 1 = Internal Time

2.4.2 Non C-C/Response Packet Payload Bodies

2.4.2.1 Change Data Packet Payload Body

The Change Data Packet Payload Body contains measurement/stimulus data that have changed significantly since the last time they were sampled. Each measurement/stimulus has a unique Function Designator Identifier (FDID) associated with it to distinguish it from all other Function Designators (FDs). There are 4 sources and destinations associated with Change Data packet payloads; from the Gateways to the DDP, from the DDP to the CCPs, from the CCPs to the DDP, and from the DDP to the HCI Workstations.

2.4.2.1.1 Gateway To DDP Change Data Packet Payload Body

The following data describes the Change Data Packet Payload Body which is sent at the SSR (System Synchronous Rate) from each Gateway to the DDP. The Change Data Packet Payload Body contains 2 types of data: 2-byte time entries and a number of change data entries (see paragraph 2.4.2.1.1.1).

There are 2 bits of status in each change data entry;

1. Bit 7 (labeled Sf) is the Gateway fail status bit and, when set, means this entry is not valid (FD processing inhibited, global processing is inhibited, a non-critical anomaly (such as loss of sync) is occurring persistently, etc). This bit being set will result in applications not processing this data as valid data.
2. Bit 6 (labeled Sw) is the Gateway warning status bit. When set, an engineer will receive a message to that effect and must analyze the reason for the bit being set. The engineer has the capability to set the Hf bit in the DDP (via Engineering) as a result of his analysis to prevent applications from processing this data.

The following table describes the conditions for setting Sf and Sw.

Table 4. OR Conditions for Status Bits Sf and Sw

SET Sf	SET Sw	IF	IS PERSISTENT
Y		FD Data Acquisition/Processing is Inhibited	
Y		Global Data Acquisition/Processing is Inhibited	
Y		GSE Manchester Error	Y
Y		GSE Parity Error	Y
Y		GSE No Response from HIM	Y
Y		PCM No Longer in Current Format	
Y		PCM Frame Count Error	Y
Y		PCM Area Format Change	
Y		ME Word Count Error	Y
Y		ME Column Parity Error	Y
Y		On-Board Dumps (that are longer than TBD)	
	Y	Data count is out of range (range normally is 3-253 counts)	
	Y	Data Not Changing at Expected Rate (Stale)	
	Y	Data Conversion Error	

The following tables describe each entry of the Gateway to DDP Change Data Packet Payload Entries. In general, bits 14-12 of the first word of each entry specify the number of 16-bit words that follow the first word. The lone exceptions are the MS Offset Time Entry and the Variable Length Change Data Entry. Developers must use the smallest entry below that fits the data type being sent over the RTCN.

Table 5. Example of First Word of a Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	Length Following			Time				Sf	Sw	Spare			R	FDID	

S = Spare
Length Following = In general, this value is equal to the number of words following the First Word
Time = 100 usec elapsed since last MS entry
Sf (Status Fail) = Gateway Status Bit 1 = FD status is known by the Gateway to be invalid
Sw (Status Warn) = Gateway Status Bit 2 = FD quality is known by the Gateway to be questionable
R = Reserved
FDID = 2 MSBs of 18-bit FDID

Table 6. MS Offset Time Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	0			MS Time Offset From Time Entry in Header											

Table 7. Variable Length Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	1			Time				Sf	Sw	Spare			Spare		
Length Following								Spare					R	FDID	
FDID - 16 LSB															
Data															
.															
.															
.															
.															
Data															

The above entry can be used for FDs greater than 96 bits in length.

Table 8. 16-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	2			Time				Sf	Sw	Spare			R	FDID	
FDID - 16 LSB															
Data															

Examples of data using above entry:
- <17-Bit Digital Pattern
- Discrete (Portrayed as 0x0000 or 0xffff)
- THDS (Time-Homogeneous Data Set) Complete

Table 9. 32-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	3			Time				Sf	Sw	Spare			R	FDID	
FDID - 16 LSB															
Data															
Data															

Examples of data using above entry:
- < 17-Bit Analog Converted to 32-Bit IEEE 754
- 17-32 Bit Digital Pattern
- GMT (Counts)
- CDT (Counts)

Table 10. 48-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	4			Time				Sf	Sw				R	FDID	
FDID - 16 LSB															
Data															
Data															
Data															

Example of data using above entry:
- 48-Bit Digital Pattern

Table 11. 64-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	5			Time				Sw	Sf	Spare			R	FDID	
FDID - 16 LSB															
Data															
Data															
Data															
Data															

Example of data using above entry:
- 64-Bit IEEE 754 FP
- GPC FP converted to IEEE 754 FP
- 64-Bit MWDP (Multi-Word Digital Pattern)

Table 12. 80-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	6			Time				Sf	Sw	Spare			R	FDID	
FDID - 16 LSB															
Data															
Data															
Data															
Data															
Data															

Example of data using above entry:
- Date

Table 13. 96-Bit Change Data Entry

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
S	7			Time				Sf	Sw	Spare			R	FDID	
FDID - 16 LSB															
Data															
Data															
Data															
Data															
Data															
Data															

2.4.2.1.1.1 GSE/PCM Change Data Packet Payloads

The following tables illustrate what the GSE and PCM Change Data Packet Payloads contain. In the GSE table, the MS time for the first change data entry is contained in the header time byte and MS time entries appear in the data stream as MS time of day changes (providing data changes occur in that MS). In the PCM table, the MS time for the first change data entry is also contained in the header time byte. However, because an entire PCM frame is accumulated before it is change checked, change data is at least 10 MS old before it is checked and accurate time-tagging is therefore impossible. The only times that appear in the PCM table are the header time entry (time that processing started) and the time entry at the end of the Packet Payload Body (time that processing was completed).

Table 14. GSE Change Data Packet Payload Contents (Hdr = 16 bytes)

Hdr	Data	Data	Data	Data	Time	Data	Data	Data	Time	Data	Data

NOTE: For GSE, time compression is employed.

Table 15. PCM Change Data Packet Payload Body Contents (Hdr = 16 bytes)

Hdr	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Time

2.4.2.1.1.2 Change Data and Time Homogeneous Data Sets (THDS) Processing Description

The process for change data from the Gateway is as follows:

- The Gateway will transmit FDs as they change.
- The DDP will perform data health, and data fusion processing
- The DDP will store changes into the current value tables
- The DDP will perform the data distribution process

The proposed process for THDS is as follows:

- When the Gateway determines that the last member of the THDS has been received it will transmit the proposed THDS Change Data Packet Payload Body Entry to the DDP
- The DDP will move the members of the THDS from the CVT into 1 of 2 toggle buffers.
- The DDP will perform data health processing for the THDS
- The DDP will store the data health of THDS in the toggle buffer, the THDS Change Data Packet Payload Body Entry, and the CVT entry for the THDS FD
- The DDP will specify that the new THDS toggle buffer is the one to use
- The DDP will perform normal data distribution to the CCP and HCI which will include the THDS Change Data Packet Payload Body Entry (with health)
- The receiving CCP and HCI will only be required to perform the copying of the THDS member's data from the CVT to the toggle buffer and specifying that the new toggle buffer is the one to use.

The above THDS process is being proposed for the following reasons:

- Minimal bandwidth on the network
- Data Path Health is the responsibility of the DDP and the health algorithm for the THDS is performed in the DDP
- Data Health for the THDS is stored by the DDP in the THDS Change Data Packet Payload Body Entry for data distribution to the CCP and HCI.

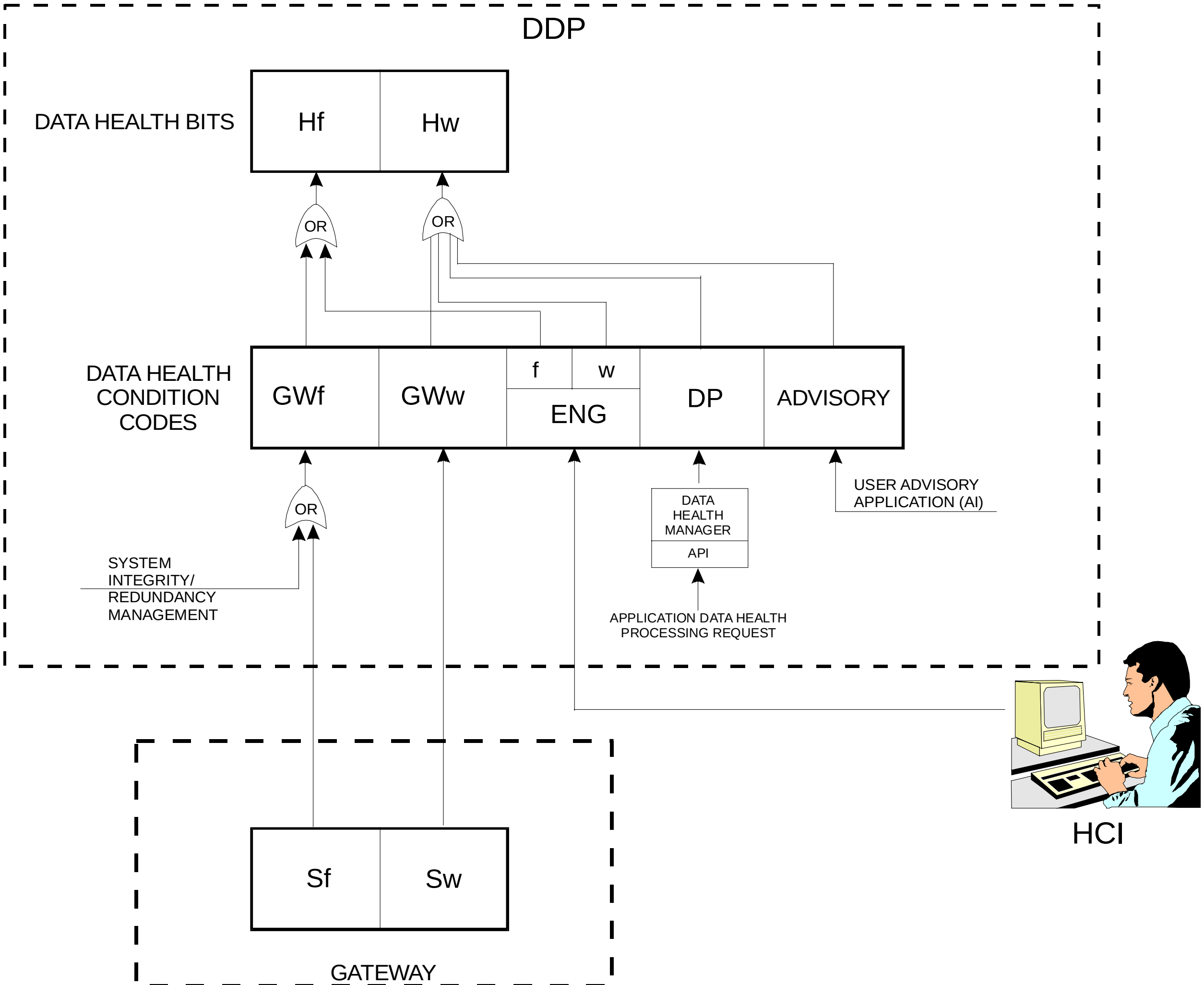
2.4.2.1.2 DDP to CCP Change Data Packet Payload Body

The DDP to CCP Change Data Packet Payload Body contains data similar to the Gateway to DDP Packet Payload Body. The header is the same, with the exception that it contains a time entry which correlates to the earliest change data in the packet. In addition, this body contains Fused FDs and Application Derived FDs. The payload packet is transmitted at the SSR.

There are 2 bits of status in each change data entry received from the Gateways, Sf and Sw. When these bits are transferred by the DDP into the Current Value Table (CVT), they are referred to as GWf and GWw. The GWf bit is Ored with ENGf to create Hf.. The GWw bit is Ored with ENGw, DP, and ADVISORY bits to create Hw. Hf and Hw serve as indicators to applications as to the validity of the data. When Hw is initially set, the engineer/operator is notified via the HCI. The engineer has the option of analyzing the reason for Hw being set and manually setting Hf, if, in his judgment., it is justified.

Figure 1. below shows pictorially how these bits are set and reset.

Figure 1. Status and Health Bits



2.4.2.1.3 CCP to DDP Change Data Packet Payload Body

The CCP to DDP Change Data Packet Payload Body is identical in format and content to the Gateway to DDP Change Data Packet Payload Body. It contains derived FDs and is transmitted at the SSR.

2.4.2.1.4 DDP to HCI Change Data Packet Payload Body

The DDP to HCI Change Data Packet Payload Body is identical in format and content to the DDP to CCP Change Data Packet Payload Body, with the exception that it is transmitted at the DSR (Display System Rate).

2.4.2.2 Health and Status Packet Payload Body

The Health and Status Packet Payload is transmitted by all platforms at the SSR or DSR and contains a heartbeat (health counter) that is incremented by one each time it is sent. Once per second, the Health and Status Packet Payload will also contain all performance, health, and status data available for the applicable platform. Performance data consists of (but is not limited to) I/O use counts, network use counts along with average/min/max payload sizes sent and received for the current second (also average/min/max payload sizes sent in the highest second since initialization), CPU utilization for the current second (also the CPU utilization sent in the highest second since initialization), and other available performance figures. Health data consists of the health counter, I/O error counters and types of errors, and other available health figures. Status data consists of format IDs for each area, which HIMs are activated/inhibited, The state of the node (acquiring data, running ORT, etc.)

The exact data that is transmitted and the contents of the Health and Status body will have to be defined by developers as the system matures. No byte counts or positions of data need to be given within the Packet Payload Body because each sending and receiving node should be aware of the predefined data structure for each platform. Table 16.and Table 17.give a general idea of the potential contents of the Health and Status Packet Payload Bodies.

Table 16. Sample Health and Status Packet Payload Body at the SSR or DSR

2 bytes
Health Counter

Table 17. Sample Health and Status Packet Payload Body at a One-Second Rate

Health Counter (2 bytes)	TCID (12 bytes)	Sim/Not Sim/Tail# (1 byte)	Device #1 Name (6 bytes)
Dev#1 Use Cnt (2 bytes)	Dev#1 Err. Cnt (2 bytes)	Device #1 Last Error Code (2 bytes)	
Device #2 Name (6 bytes)	Dev#2 Use Cnt (2 bytes)	Dev#2 Err. Cnt (2 bytes)	Last Error Code (2 bytes)
etc.	etc.	etc.	etc.
Netwk dev. Name (6 bytes)	Use Cnt (2 bytes)	Error Cnt (2 bytes)	Last Error Code (2 bytes)
Min Payload Size	Max Payload Size	Avg Payload size	

2.4.2.2.1 Gateway Health and Status Packet Payload Body

The Gateway Health and Status Packet Payload is sent to the DDP at the SSR. It is sent just prior to the Change Data Packet Payload.

2.4.2.2.2 DDP Health and Status Packet Payload Body

The DDP Health and Status Packet Payload is sent to the **TBD** at the SSR. It is sent just prior to the Change Data Packet Payload.

2.4.2.2.3 CCP Health and Status Packet Payload Body

The CCP Health and Status Packet Payload Body is sent to the **TBD** at the SSR.

2.4.2.2.4 HCI Health and Status Packet Payload Body

The HCI Health and Status Packet Payload Body is sent to the **TBD** at the DSR.

2.4.2.3 Log Data Packet Payload Body

The Log Data Packet Payload Body is transmitted from each platform to the recorder as events occur that warrant recording (errors, system messages, keystrokes, etc.). The Log Data can be sent on either the RTCN or the DCN and by any platform. The detailed contents of the Log Data Packet Payload Bodies are presented in Section 4, LOG DATA PACKET PAYLOAD BODIES. The general contents of the Log Data Packet Payload Body are as follows:

Table 18. Log Data Packet Payload Body

2 Bytes	2-n bytes
LOG ID	LOG Data

2.4.2.4 System Event Code Packet Payload Body

The System Event Code Packet Payload Bodies contain 2-byte codes that are generally used to broadcast system Health and Status changes (such as Gateway in GO mode, Gateway requests switchover, HIM status change, etc.) to multiple nodes in the set and to the Recorder. The contents of the System Event Code Packet Payload Body are described in the table below:

Table 19. System Event Code Packet Payload Body

2 Bytes	2 bytes	2-n bytes
Event Code	Receiver	LPORT and/or Additional Data

The following is a list of System Event Codes that are in use by the existing system. They are included here for reference only. The actual RTPS System Event Codes will have to be designed by the developers as the system matures.

System Event Code = 14 = Subsystem loaded
= 15 = Subsystem communicating
= 16 = Subsystem in GO mode (data valid)
= 17 = Subsystem in NO GO (data invalid)
= 18 = Subsystem not communicating
= 19 = Special Subcode
= 0 = Mandatory SCT read
= 1 = Inhibit stack code processing
= 2 = TCG1 Active
= 3 = TCG2 Active
= 4 = GMT sync
= 5 = Type II console sync
= 6 = Integration relinquish control
= 7 = Terminate subsystem
= 8 = Send next checksum update
= 9 = Read date
= 20 = Switchover, primary failure
= 21-24 = HIM status change (event code = HIM # + 15)
= 25 = PCM or LDB status change
= 26 = PCM format ID address change
= 27 = Switchover required
= 28 = Subsystem operational
= 29 = Subsystem non-operational

2.5 C-C/Response Packet Payloads

2.5.1 C-C/Response Packet Payload Headers

The C-C and C-C Response headers are each 32 bytes in length and contain the following data:

Table 20. C-C and C-C Response Headers

Bytes	C-C To Destinations	Bytes	Response From Destination
1	Payload Type (C-C type = 1)	1	Payload Type (response type = 0)
1	Flags	1	Flags
1	Source Logical RSYS ID (or 0 if N/A)	1	Responder's RSYS ID (or 0 if N/A)
1	Source Logical CPU ID	1	Responder's Logical CPU ID
1	Destination 1 Logical RSYS ID if applicable (or 0)	1	Destination 1 Logical RSYS ID if applicable (or 0)
1	Destination 1 Logical CPU ID (Active)	1	Destination 1 Logical CPU ID (Active)
1	Destination 2 Logical RSYS ID if applicable (or 0)	1	Destination 2 Logical RSYS ID if applicable (or 0)
1	Destination 2 Logical CPU ID (Active)	1	Destination 2 Logical CPU ID (Active)
2	Number of bytes in payload	2	Number of bytes in payload
2	Time (Status/JDAY)	2	Time (Status/JDAY)
4	Time (GMT)	4	Time (GMT)
1	Place	1	Place
1	Spare	1	Spare
2	Source's Reference Designator	2	Responder's Reference Designator
2	Destination 1 Reference Designator	2	Destination 1 Reference Designator
2	Destination 2 Reference Designator	2	Destination 2 Reference Designator
2	Source Application ID (or 0)	2	Responder's Application ID (or 0)
2	Destination 1 Application ID (or 0)	2	Destination 1 Application ID (or 0)
2	Destination 2 Application ID (or 0)	2	Destination 2 Application ID (or 0)
2	Transaction ID	2	Transaction ID
1	Routing Code	2	Transaction ID being responded to
1	Request ID	2	Completion Code (0=successful)
6	Spare (init to 0)	4	Spare (init to 0)
32	TOTAL BYTES	32	TOTAL BYTES

NOTE: Some C-Cs, such as a SET <FD> ON, when entered at an HCI, must first pass through a CCP prior to being forwarded to the final destination, a Gateway. Also the response must travel the reverse route. For these C-Cs, the Source is the HCI, Destination 1 is the CCP, and Destination 2 is the Gateway. For the responses, the Responder is the Gateway, Destination 1 is the CCP, and Destination 2 is the HCI. For C-Cs that travel between only 2 nodes, such as CCP1 and a GS1A, the Source is CCP1, Destination 1 is GS1A, and Destination 2 is all 0s.

Following is a description of the fields that are not obvious in the above table:

1. Payload Type = 1 byte = 1 = C-C Packet Payload, = 0 = C-C Response Packet Payload
2. Flags = 1 byte = flags = B7 = 1 = A response is expected
   = B6 = 1 = Log This Transaction Locally
   = B5 = 1 = Log This Transaction Temporarily
   = B4 = 1 = Log This Transaction to Archive Storage
   = B3 = 1 = One or more logging bits have been modified by a command
3. Place = 1 byte = An identifier of the Test Set that is the source of this transmission
4. Transaction ID = 2 bytes = a running packet payload transaction sequence number
5. Time = 6 bytes = Time in MS (as previously described in Non C-C/Response Packet Payload Headers)
6. Routing Code = 1 byte = CSC to use as destination for this C-C
7. Request ID = 1 byte = Type of transaction for above routing code

8. Transaction ID being responded to = 1 byte = the C-C sequence number that is associated with this response.
9. Completion Code = 2 bytes = 0 = successful. Any response other than 0, will be a numerical value indicating the reason for failure

Although the Logical RSYS and Logical CPU Ids have not yet been assigned, the following table provides a general idea of one way this assignment might proceed.

Table 21. Sample Firing Room Logical RSYS IDs And Logical CPU IDs For C-C Headers

LOGICAL RSYS ID	RSYS (Responsible System) NAME	LOGICAL CPU ID	CPU NAME
1	CARGO	1	GS1A
2	CPLE	2	GS1S
3	ETCO	3	GS1H
4	COMM	4	GS2A
5	NAVAID	5	GS2S
6	PLBD	6	GS2H
7	MECH	7	GS3A
8	PLINTG	8	GS3S
9	LO2	9	GS3H
10	TPROP	10	PCMA
11	SSME	11	PCMS
12	LH2	12	PCMH
13	MPS	13	ME1
14	BRS	14	ME2
15	TRS	15	ME3
16	ECLSS	16	UPLK
17	PVD	17	LDBA
18	ECS	18	LDBS
19	FCP	19	LDBD
20	FCPRSD	20	LDBH
21	GOXARM	21	CDL1
22	WATER	22	CDL2
23	ARMS	23 - 32	RESERVED
24	HYFUEL	33	CCP1
25	HYDORB	34	CCP2
26	APU	35	CCP3
27	HYD	36	CCP4
28	BHYD	37	CCP5
29	HYDSRB	38	CCP6
30	HYOXID	39	CCP7
31	HYHEGN	40	CCP8
		41 - 62	RESERVED
		63	HCI1
		.	.
		.	.
		TBD	HCIx
		TBD	RECORDER

2.5.2 C-C/Response Packet Payload Packet Bodies

The C-C/Response Packet Payload Bodies are described in Section 3, C-C/RESPONSE PACKET PAYLOAD BODIES.

2.6 Packet Payload Header Time Entry Definition

The time entry in the header of RTPS packet payloads can contain any one of 3 different times as a function of the type and the source of the packet payload. In some cases, the header time entry will contain the time that the packet payload was queued for transmission. In some cases the header time entry will contain the time of the first entry of changed data (as in the PCM and GSE Change Data Packet Payload). And finally, in some cases, the header time entry will contain data stream time (as described in the following paragraph). By using 3 different times in different headers, analysis of data retrievals could reveal more data about the event that triggered the generation of the payload packet than would otherwise be possible.

2.7 Definition of Data Stream Time

In order to adequately time correlate retrieved events with the activities of the subsystems at the time of the event, it is sometimes necessary for the retrieval to have access to what is referred to as data stream time, since a data stream event may be what triggered the generation of the packet payload. For this reason, it is proposed that as time-tagged data arrives at the DDP, CCP, or HCI, a running “time” variable be maintained by each subsystem. This “time” variable tracks data stream time. When a logging event occurs, the “time” variable should be immediately inserted into the packet payload header (dependent upon the payload type and source, as defined in the table below) for recording. This would allow retrievals to provide both the event’s GMT and the appropriate time for each event, as specified in the table below. For the PCM and GSE Gateways, header time is equivalent to data stream time because it is derived from local GMT. The following table specifies the contents of the header time entry for each packet payload type and source.

Table 22. Definition Of Time Entry In Packet Payload Headers

PAYLOAD TYPE	SOURCE	TIME PLD QUEUED FOR XMISSION	TIME OF FIRST ENTRY	DATA STREAM TIME
Change Data	GSE/PCM		Y	
	DDP		Y*	
Health & Status	GSE/PCM	Y		
	LDB	Y		
	DDP	Y		
	CCP	Y		
	HCI	Y		
Log Data	GSE/PCM	Y		
	LDB	Y		
	DDP			Y
	CCP			Y
	HCI			Y
System Event Code	GSE/PCM	Y		
	LDB	Y		
	DDP			Y
	CCP			Y
	HCI			Y
C-C	GSE/PCM	Y		
	LDB	Y		
	DDP			Y
	CCP			Y
	HCI			Y
C-C Response	GSE/PCM	Y		
	LDB	Y		
	DDP			Y
	CCP			Y
	HCI			Y

* = DDP uses earliest time entry from All Gateway Change Data Headers

3. C-C/RESPONSE PACKET PAYLOAD BODIES

The following tables define the contents of the CCMS-I C-C and Response Packet Payload Bodies. In some cases the contents of bodies have been, and will continue to be, updated to RTPS formats with inputs from developers.

TBS

Copies of this section in it’s current form are available upon request. Tom Jamieson 1-2263

4. LOG DATA PACKET PAYLOAD BODIES

The following tables define the contents of the CCMS-I Log Data Packet Payload Bodies. In some cases the contents of bodies have been, and will continue to be, updated to RTPS formats with inputs from developers.

TBS

Copies of this section in it's current form are available upon request. Tom Jamieson 1-2263

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